107. Which impression technique attempts to simulate tissue conditions in a preloaded, pressurized state and captures soft tissues in an anatomical state leading to minimal overextension?

a. Anatomic
b. Functional
c. Mucostatic
d. Selective pressure

ANSWER d. selective pressure technique

An **ANATOMIC** impression captures the hard tissues in an unloaded state; unfortunately, it tends to distort and overextend soft tissue areas.
A denture base made to anatomic form exhibits less stability under rotating forces, and fails to maintain its occlusal relation with opposing dentition.
A **FUNCTIONAL** impression records the shape of the patient's mouth over a period of time as developed by the patient's own functional movements and anatomy and is a static representation of the dynamic forces placed on the tray and impression material. This impression lacks to the fine detail seen with other techniques.
A **MUCOSTATIC** impression captures the fine details of the tissue using a fast-set material in an unloaded state (ie: ZOE). It captures intimate tissue detail of very healthy, unloaded keratinized tissues. Tray contains free-flowing, quick setting, and rigid setting impression material.
A **SELECTIVE PRESSURE** technique is preferred in many cases as it allows the primary denture bearing areas (posterior ridges and tuberosities for the maxilla, buccal shelves and retromolar pad areas in the mandible) to be selectively loaded while the secondary supporting areas are not subjected to as much force. The secondary supporting areas are the anterior ridge and midline raphe in the maxilla and anterior and posterior ridges in the mandible. This helps to simulate tissue conditions under function and helps the final prosthesis to fit better.
It captures primary denture bearing areas in a pre-loaded and pressurized state. Soft tissues are captured anatomically with minimal overextension.

IMPRESSION PHILOSOPHIES

	Major Uses / Indications	Impression Materials of Choice	Closed / Open Mouth	Tray Type	Loaded / Unloaded	Final / Intermediate	Major Proponents
ANATOMIC	Diagnos. casts RPD framework C&B/transfer	Alginate Alg./PVS/RB RB/PVS/PE	Open Open Open	Stock Stock/Custom Custom	Unloaded Unloaded Unloaded	Case Dependent Final Final	Many Proponents
FUNCTIONAL	Tissue condi. /CD (rare)	Viscogel/Lynol Wax/liner	Open/Closed Open/Closed	Mod Prosthesis Custom	Loaded Loaded	Intermediate Final	Lytle, Applegate, Meist
SELECTED PRESSURE	Dentures Corrected cast Relines/rebases	RB/PVS/ZOE/Wax RB/PVS/ZOE/Wax RB/PVS/ZOE	Open Open Open	Custom Custom Mod Prosthesis	Loaded Loaded Loaded	Final Final Final	Boucher, Heartwell Rahn
MUCOSTATIC	RPD CD/ant. ridge CD/ tuberosity /CD ant. ridge	ZOE/ Plaster ZOE/plaster/LRB ZOE/plaster/LRB ZOE/plaster/LRB	Closed Open Open Open	Custom Custom Custom Custom	Unloaded Unloaded Unloaded Unloaded	Final Final Final Final	Page, Clayton, Preiskel

Anatomic Impression: Very useful for capturing hard tissues in an unloaded state. The soft tissues, especially peripheral extensions, are often distorted and overextended.

Functional Impression: Developed by the patient's own functional movements and anatomy. Develops a final cast which is a static representation of the dynamic forces placed on the tray and impression material.

Selected Pressure Impression: Develops a final cast which seeks to capture the primary denture-bearing areas in a somewhat pre-loaded and slightly pressurized state, but yet captures remaining soft tissues anatomically and with very minimal overextension. Vestibular areas are developed to permit a seal without overextension or discomfort, counteract processing errors, and limit tissue rebound or bounce upon delivery.

Mucostatic Impression: Captures intimate tissue detail of very healthy, unloaded keratinized tissues by using a tray which contains, but not pressurizes, a very free-flowing, quick setting, and rigid-setting impression material.

MacCracken's Removable Partial Prosthodontics, 10th ed .
Krol AJ, Jocobson TE, Finzen FC. Removable partial design: outline syllabus. 5th Ed. Indent. 1999.
Felton DA, Cooper LE, Scurria MS. Predictable impression procedures for complete dentures. Dent Clin N Amer Jan 1996; 40(1): 39-51.

108. RPI clasp design in a distal extension removable partial denture is based on:

A. Class (I) lever (Wheelbarrow)
B. Class (II) lever (Wheelbarrow)
C. Class (I) lever (See-Saw)
D. Class (II) lever (See-Saw)

Answer: B. Class (II) lever (Wheelbarrow)

When subjected to intraoral forces, RDP can perform the actions of 2 simple machines:
Lever : First, Second, and Third class
Inclined plane
Class (III) is the least efficient system

RPA (distal rest): distal extension RDP that creates a class (I) lever (See-Saw)
RPI (mesial rest): distal extension RDP that creates a class (II) lever (Wheelbarrow/ Nutcracker)
Kennedy class 3 and rotational path RDP = class (III) lever systems (Fish pole)

Phoenix, DDS, MS, FACP, Cagna, DMD, MS, FACP, DeFreest, DDS, FACP, Stewart's Clinical Removable Partial Prosthodontics, Fourth edition, 2008.

109. Contraindications for the RPI system and modification with the RPA clasp should be considered when

a. Exaggerated buccal or lingual tilts exist
b. The presence of a severe tissue undercut exists
c. There is a shallow buccal vestibule
d. The desirable undercut is located in the gingival third of the tooth away from the extension base
e. All of the above

Answer: e. All of the above

Mesial rest concept clasps are proposed to accomplish movement accommodation by changing the fulcrum location. This concept included the RPI and RPA clasps. The RPD is a current concept of bar clasp design, and refers to the rest, proximal plate, and I-bar component parts of the clasp assembly. Basically, this clasp assembly consists of a mesiooccusal rest with the minor connector placed into the mesiolingual embrasure, but not contacting the adjacent tooth. A distal guiding plane, extending from the marginal ridge to the junction of the middle and gingival thirds of the abutment tooth, is prepared to receive a proximal plate. The buccolingual width of the guiding plane is determined by the proximal contour of the tooth. The proximal plate, in conjunction with the minor connector supporting the rest, provides the stabilizing and reciprocal aspects of the clasp assembly. The I-bar should be located in the gingival third of the buccal or labial surface of the abutment in a 0.01 –inch undercut. The whole arm of the I-bar should be tapered to its terminus, with no more than 2mm of its tip contacting the abutment. The retentive tip contacts the tooth from the undercut to the height of contour. This area of contact along with the rest and proximal plate contact provides stabilization through encirclement. The horizontal portion of the approach arm must be located at least 4mm from the gingival margin and even farther if possible.

If the abutment teeth demonstrate contraindications for a bar-type clasp (i.e., exaggerated buccal or lingual tilts, severe tissue undercut, or a shallow buccal vestibule) and the desirable undercut is located in the gingiva third of the tooth away from the extension base area, a modification should be considered for the RPI system (the RPA clasp).

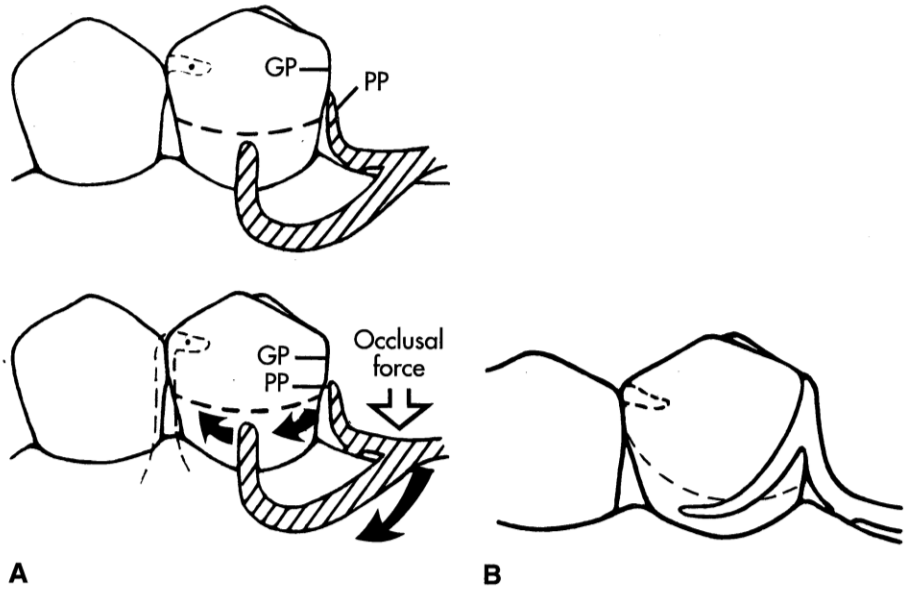


Figure 7-26 **A,** Bar clasp assembly in which proximal plate *(PP)* contacts approximately 1 mm of gingival portion of guiding plane *(GP).* During function, proximal plate and I-bar clasp arm are designed to move in mesiogingival direction, disengaging tooth. Lack of sustained contact between proximal plate and guiding plane distributes more functional force to edentulous ridge. Asterisk (*) indicates center of rotation. **B,** Modification of RPI system (RPA clasp) is indicated when bar-type clasp is contraindicated and desirable undercut is located in gingival third of tooth away from extension base area.

McCracken's Removable Partial Prosthodontics 1th edition, Carr etc. P. 94-97

110. Which of these statements are true regarding comparisons of an RPA design over an RPI assembly in a distal extension RPD?

A. The I-bar retentive arm is easier to grasp for removal of the prosthesis.
B. RPA assemblies have a completely different kind of tooth release than the RPI.
C. An RPA avoids problems associated with large tissue undercuts.
D. RPA designs do not need to be recalled as frequently.

ANSWER: C. An RPA avoids problems associated with large tissue undercuts.

The RPA design has been discussed as an alternative to the RPI design. With its mesial rest and special retentive arm design, it gives essentially the same kind of tooth release that the RPI clasp provides. In addition, there are some advantages over the RPI design. The circumferential-type retentive arm is easier to grasp for removal of the prosthesis. The clasp is simple in design with few variations among patients and thus can be easily and consistently fabricated by dental laboratories. But most important, the circumferential retentive arm avoids the tissue problems around abutment teeth and allows the RPA clasp to be used in many situations where the RPI clasp is contraindicated.

If a conventional Akers clasp is used, with the retentive arm coming off the proximal plate above the survey line and crossing the survey line in the middle of the tooth to engage the undercut, the releasing capability will be lost.

With the RPA clasp system the circumferential clasp is placed so that the rigid portion of the clasp arm will contact the tooth only along its superior border at the level of the survey line.

Eliason CM. RPA clasp design for distal-extension removable partial dentures. J Prosthet Dent. 1983 Jan; 49, 25-7.

111. With respect to Krol's design for the RPI clasp assembly, the ideally prepared guide plane is how many millimeters in height occlusogingivally?

A. 1-2mm
B. 2-3mm
C. 3-4mm
D. 5mm

Answer: B. 2-3mm

Krol's clasp assembly includes the 3 elements of Kratochvil's system: mesial rest, proximal plate and I-bar (RPI). An RPA has an Akers' clasp as opposed to an I-bar. The elements meet the requirements for 'minimal coverage'. Rest preps are less extensive with the RPI and they extend only into the triangular fossa, whereas canine rest seats are often circular, concave depressions prepared in mesial marginal ridges.

The guiding plane for the proximal plate is only 2-3mm in height occlusogingivally, and the proximal plate contacts only the apical 1mm of the guiding plane. Relief is provided at the tooth-tissue junction to allow the proximal plate to disengage when loaded; this is to improve gingival health by opening embrasure spaces as much as possible. One problem that could arise would be food impaction above the proximal plate.

Modifications to the I-bar are needed because of the reduced tooth contact with the proximal plate. The I-bar terminus, which is pod shaped to allow additional tooth contact, and the vertical portion of the clasp arm assumes a more mesial position to achieve efficient reciprocation from the smaller proximal plate. As with Kratochvil's design, occlusal force on the extension base disengages the retentive tip toward the mesial embrasure.

Phoenix, Cagna, DeFreest. Stewart's Clinical Removable Partial Prosthodontics, 4th edition.

112. When pouring up an impression, the detail of the impression will be the best if the wetting angle is:

A. 180 degrees
B. 90 degrees
C. 75 degrees
D. 0 degrees

Answer: D. 0 degrees

Wetting describes the relative affinity of a liquid for a solid. It is the degree to which a drop will spread on a solid surface, and can be quantified by observing the contact angle. High angles (greater than ninety degrees) indicate poor wetting, whilst a zero angle would indicate perfect wetting of the surface.

Mandikos, MN. Polyvinyl siloxane impression materials: An update on clinical use. Australian Dental Journal 1998;43:(6):428-34.

113. What is the byproduct of an addition silicone impression material?

a. Ethyl Alcohol

b. Hydrogen gas

c. Water

d. All components are consumed in the reaction

ANSWER b. Hydrogen Gas

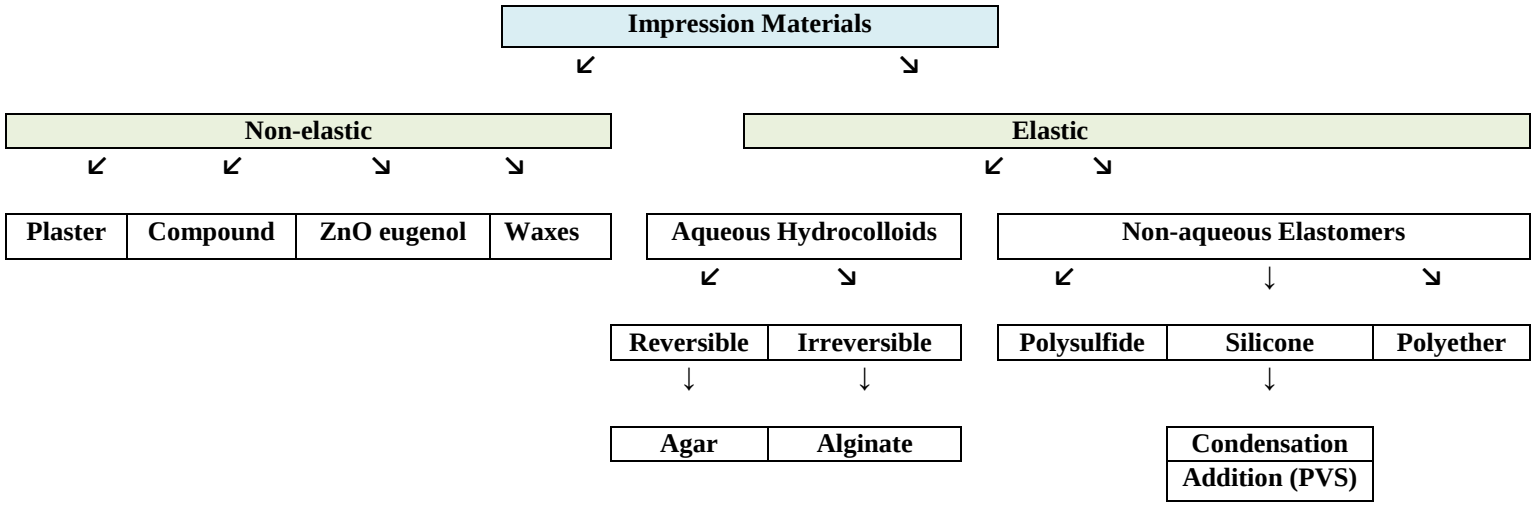
	Tear strength	Setting time	Working time	Elastic recovery	Temp Rise	By product
Irreversible hydrocolloid	0.55 kn/m	3.5 min	3.0 min	98%		
Reversible hydrocolloid	0.85 kn/m			99%		
Polysulfides	4.75 kn/m	7 min	5 min	97%	3.5 deg	H20
Silicones (condensation)	3.0 kn/m	5 min	3 min	94%	1.0 deg	EtOH
Silicones (addition)	3.4 kn/m	5 min	3 min	95%	1.0 deg	H gas
Polyethers	3.8 kn/m	6 min	2.5 min	97%	4.2 deg	heat

Craig's Restorative Dental Materials'; 12th edition; pgs, 269-305

114. As compared to addition silicones, polysulfide elastomeric impression material exhibit:

A. Less dimensional change
B. More rigidity
C. More permanent deformation
D. Less tear strength

Answer: C. More permanent deformation



Tear Strength
Polysulfides > Silicones > Polyethers
Permanent Deformation
Polysulfides > Polyethers > Condensation Silicones > Addition Silicones (PVS)
Rigidity
Polyethers > Addition Silicones (PVS) > Condensation Silicones > Polysulfides
Dimensional Change
Condensation Silicones > Polysulfides > Polyethers & Addition Silicones (PVS)

Powers, Sakaguchi, "Craig's restorative dental materials", Twelfth edition, Mosby, 2006.

115. The occlusal scheme that eliminates any anteroposterior or mediolateral inclines and directs the forces of occlusion to the posterior teeth.

A. Balanced occlusion
B. Neutrocentric occlusion
C. Lingualized occlusion
D. Organic occlusion

Answer B.

The **neutrocentric** concept using non-cusp form posterior teeth arranged on a plane, the balanced occlusion concept using cusp form posterior teeth arranged in balance in the centric and eccentric jaw positions, and the Lingualized occlusal concept, which can combine components of both of these occlusal schemes.

The occlusal form will be decided by the type of occlusion to be developed. If the teeth are to be balanced in the centric and eccentric positions, a cusp form tooth is indicated. If the posterior teeth are to be arranged on a plane and balanced in centric position only, monoplane teeth are used.

The concept of **balanced occlusion** is desired when using cusp or modified cusp form teeth and non-balanced occlusion in the eccentric positions is desired for monoplane cusp form teeth.

Balanced occlusion is based primarily on the premise that stability is provided mechanically to the denture bases on the basal seats. When the teeth are brought together at any relationship of the jaws, at least a tripod type of contacting of the teeth provides stability to the bases…The concept of centralizing the working occlusal surfaces requires bringing the occlusal surfaces toward the center of the denture foundation to their ideal positions for favorable leverage. Most favorable leverage is obtained when the occlusal working surfaces are placed to the lingual sides of the ridge crests. The inclination of teeth can be arranged on a Class II, type 3 articulator to provide bilateral and protrusive balanced occlusion.

The neutrocentric arrangement of the teeth on a plane (flat) parallel with the bony support is based primarily on physiologic principles. Although neutrocentric is used to denote the contacting of the teeth, the concept of arranging the teeth flat does involve jaw relationships.

The neutrocentric concept of occlusion maintains that the anteroposterior plane of occlusion should be parallel with the plane of the denture foundation and not dictated by the horizontal condylar guidance's. A plane is a flat, level surface. When teeth are arranged on a plane, they are not inclined to form compensating curves. In a mediolateral direction, the teeth are set flat with no medial or lateral inclination. The term neutrocentric is not used in connection with the relationship of the maxillae and mandible but is used to denote a concept of occlusion that eliminates any anteroposterior or mediolateral inclines of teeth and directs the forces to the posterior teeth.

The **Lingualized occlusion** concept represents a compromise between the concepts of balanced and neutrocentric occlusion. It attempts to combine the mechanical stability and esthetic advantages of balanced occlusion with the physiologic principles of neutrocentric occlusion in a flexible manner. This allows the practitioner to develop an occlusal scheme that meets the needs of the patient rather than the dictates of any single idea of occlusal design…The concept of Lingualized occlusion is very important because of the large number of different patient situations for which it can be used. For purposed of this discussion the definition of Lingualized occlusion is limited here to one where the maxillary lingual cusps are the main functional occlusal elements. These may oppose mandibular zero degree or shallow cusp teeth in balanced or non-balanced patterns depending on the needs of the patient. Inherent in this definition is the flexibility and power of the Lingualized philosophy. By allowing the maxillary cusp to function against a variety of opposing occlusal surfaces, the advantages of many other occlusal schemes can be accommodated while their disadvantages can be ignored. The Lingualized occlusal scheme can be used in every instance in which anatomic teeth are used in balanced occlusion. It can also be used in most situations where 0◦ teeth are applied in neutrocentric or monoplane occlusal schemes.

The concept of **spheric occlusion** involves the position of the teeth with anterior-posterior and mediolateral inclines in harmony with a spherical surface.

The concept of **organic occlusion** calls for altering the shape of the cusps of the teeth to provide prosthetic teeth that have cusps suitable for the individual patient. The ridge and groove directions of the posterior teeth are determined as a result of the movements of the condyles.

Textbook of Complete Dentures 5th edition, Rhan and Heartwell p357-371

116. When fabricating a Kennedy Class 2 Mandibular RPD opposing a Complete Denture it's desirable to have:

A. Mutually protected occlusion
B. The prosthesis holding the opposing natural teeth apart
C. Artificial teeth on the upward incline of the mandibular ridge
D. Light contact with opposing natural teeth in maximum intercuspation

ANSWER: D. Light contact with opposing natural teeth in maximum intercuspation

1. Simultaneous bilateral occlusal contact of opposing posterior teeth should be present when the patient is in maximal intercuspal position. Contact must occur between natural teeth, between natural and artificial teeth, and between artificial teeth. A prosthesis must not hold opposing natural teeth apart, or some form of destruction will occur.

3. For a removable partial denture opposing a complete denture, balanced articulation is desirable. Balanced articulation is the bilateral, simultaneous contact of anterior and posterior teeth in centric and eccentric positions. The inability to achieve bilateral balance may result in an unstable denture and destruction of the residual ridge.

4. In Class IV applications, it is desirable to have light contact with the opposing natural teeth in maximal intercuspal position. This prevents further eruption of the natural teeth and improves the stability of the dental arch. Eccentric occlusion must be developed so the prosthetic teeth are in harmony with the chosen occlusal scheme (ie, mutually protected articulation, group function articulation, or balanced articulation).

5. Artificial teeth should not be positioned on the upward incline of the mandibular ridge (as it ascends the mandibular ramus). Placement of forces in this region produces an inclined plane effect involving the intaglio surface of the prosthesis and the tissues of the mandibular ridge. This may result in movement of the prosthesis and the application of destructive forces to the remaining teeth and tissues.

Phoenix, Rodney D. Stewart's Clinical Removable Partial Prosthodontics, 3rd Ed. Quintessence Publishing, 2003.

117. When a patient presents with an edentulous ridge to be restored with a removable denture against an opposing ridge with natural dentition, all of the following should be taken into consideration except?

A. Denture tooth forms should be chosen after examination of occluding natural teeth
B. Goals are esthetics, harmony and function
C. Prevention of combination syndrome
D. Natural teeth should be adjusted using a 30° template
E. All of the above should be considered when treatment planning this case

Answer: D.Natural teeth should be adjusted using a 30° template

A 20° template should be used, not a 30° template. A Broderick Plane Analyzer is also a method used to modify the opposing natural dentition arch. Either method should be carried out on an articulated cast prior to adjusting the natural teeth.

Combination Syndrome, which is seen most often in the edentulous maxilla opposing natural mandibular teeth, as described by Elsworth Kelly, includes:

- Papillary hyperplasia
- Maxillary anterior ridge resorption
- Extrusion of mandibular anterior teeth
- Downgrowth of maxillary tuberosities & pneumatization of sinuses
- Mandibular posterior ridge resorption

118. What is the most likely cause for a denture patient who presents with generalized pain present on ridge?

A. Overextension of the labial flanges
B. Increased Occlusal Vertical Dimension
C. Inadequate Posterior Palatal Seal
D. Protrusive Interferences

ANSWER: B. Increased Occlusal Vertical Dimension

Sometimes generalized irritation or soreness of the basal seat will develop. Although this condition may be attributable to a number of factors (such as an excessive vertical dimension of occlusion, nutritional or hormonal problems, or unhygienic dentures), it more likely is due to the occlusion. As indicated previously, errors in occlusion should be suspected whenever a patient states that the dentures are "tight when I first put them in my mouth in the morning but seem to loosen later in the day." A collection of calculus on the teeth on one side of the denture also indicates the need for correcting the occlusion.

Certain symptoms at an adjustment appointment suggest an insufficient interocclusal distance. The patient may comment, "After I've worn the new dentures for several hours, my gums get sore and the muscles in the lower part of my face seem tired." On removal of the dentures, the mucosa of the basal seat often will exhibit a generalized irritation. These symptoms indicate that when the patient's mandible is in the resting position, there is not sufficient space between the opposing teeth to allow the supporting structures of the residual ridge and the involved muscles to rest normally. If this is true, several options exist. Sometimes creating a small amount of additional interocclusal distance will solve the problem, and the dentist can do this by returning the dentures to the articulator and grinding the artificial teeth to reduce the vertical dimension of occlusion; esthetics and the amount of clearance between the anterior teeth are the limiting factors in this procedure, and another 1 to 1.5 mm of interocclusal distance can thus be created. Other times it may be necessary to reset the artificial teeth of one or both dentures; the decision as to which teeth should be moved is based on esthetics and the vertical dimension of occlusion. Finally, in some instances, the dentures will have to be

Zarb, George. *Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prostheses, 12th Edition*. Mosby, 2003.

119. If an RDP abutment is periodontally involved, it is best to:

a. Use chromium cobalt clasp, short clasp length and small diameter
b. Use chromium cobalt, short clasp length and large diameter
c. Use wrought wire and a long clasp length
d. Use wrought wire and a short clasp design

ANSWER c. Use wrought wire and a long clasp length

The more flexible the retentive arm of the clasp, the less load is transferred to the abutment. It is also noted that a flexible clasp arm offers less resistance to displacement in the horizontal plane, thus allowing the generation of more destructive, non axial loads. Therefore, as the flexibility of the clasp increases, the vertical and lateral stresses transmitted to the residual ridge are increased.

In practice, the dentist must decide which requires more protection-an abutment or the associated residual ridge. If the periodontal condition of the abutment is good, a less flexible clasp, such as a vertical projection T or modified T clasp may be indicated. A vertical projection clasp transfers a moderate percentage of an applied load to the abutment, and the remainder to the tissues of the ridge. **If the periodontal support is questionable, a wrought-wire retentive clasp may be selected. This clasp places a smaller percentage of the load on the abutment, and a greater percentage on the residual ridge.**

The more flexible the clasp, the less stress will be placed on the abutment. Doubling the length of a clasp will increase its flexibility fivefold. Claps length may be increased by using a curved, rather than straight, course on an abutment tooth.

A clasp constructed of a chromium based alloy will normally exert a greater load on the abutment than will a gold-based alloy or wrought wire (all things being equal like length, diameter)

Phoenix, R. et al; Stewart's Removable Partial Prosthodontics 4th edition; pgs 103-105

120. When designing a Kennedy Class (III) removable partial denture, it is not required to include:

A. Direct retainers
B. Indirect retainers
C. Major connectors
D. Reciprocal arms

Answer: B. indirect retainers

- Kennedy Class (III) RDP is entirely tooth supported (unilateral or bilateral)
- It may be made to fit the prepared surfaces of the anatomic form of the teeth and surrounding structures
- It does not require an impression of the functional form of the ridge tissue
- Kennedy Class III and IV do not require indirect retention
- Unless a need for later relining is anticipated, denture base may be made of metal
- It can be used as a valuable aid to periodontal treatment because of its stabilizing influence on the remaining teeth

Carr, DMD, MS, McGivney, DDS, FACD, Brown, DDS, MS, "McCracken's removable partial prosthodontics", Eleventh edition, Mosby, 2005.

121. In general or unless the abutment tooth has been specifically contoured:

a. The reciprocal arm must be in contact during the time of retainer arm deformation
b. The reciprocal arm must not be in contact during the time of retainer arm deformation
c. The reciprocal arm will not come into contact with the tooth until the denture is fully seated
d. The reciprocal arm will come into contact with the tooth until the denture is 2/3'rds seated

Answer A.

Reciprocal arms are intended to resist tooth movements in response to the retainer arm deforming as it engages a tooth height of contour. The opposing clasp arm reciprocates the effect of this deformation as it prevents tooth movement. For this to occur, the reciprocal arm must be in contact during the time of retainer arm deformation. Unless the abutment tooth has been specifically contoured, the reciprocal clasp arm will not come into contact with the tooth until the denture is fully seated and the retentive clasp arm has again become passive. When this happens, a momentary tipping force is applied to the abutment teeth during each placement and removal. This may not be a damaging force—because it is transient—so long as the force does not exceed the normal elasticity of the periodontal attachments. True reciprocation during placement during placement and removal is possible only through the use of crown surfaces made parallel to the path of placement. The use of cast restorations permits the parallel surfaces to be contacted by the reciprocal arm in such a manner that true reciprocation is made possible.

Carr, Alan. McGiveny, Glen. Brown, David. McCracken's Removable Partial Prosthodontics 11th edition. P. 92

122. RPD rest seat preparations should be:

A. 0.5 mm thick where it crosses the marginal ridge
B. One third to one half the mesiodistal diameter of the tooth
C. One fourth the buccolingual width of the tooth measured cusp tip to cusp tip
D. Inclined slightly away from the center of the tooth.

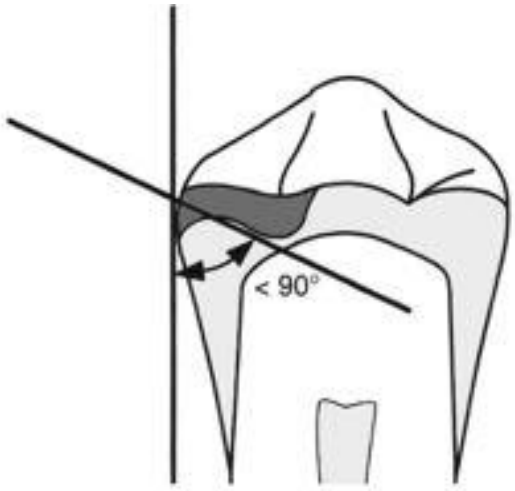
ANSWER: B. One third to one half the mesiodistal diameter of the tooth

The outline form of an occlusal rest seat should be triangular, with the base of the triangle located at the marginal ridge and the rounded apex directed toward the center of the tooth.

The rest seat should occupy one third to one half the mesiodistal diameter of the tooth and approximately one half the buccolingual width of the tooth measured from cusp tip to cusp tip.

The floor of the occlusal rest seat must be inclined slightly toward the center of the tooth. An angle greater than 90 degrees not only will not transmit the forces vertically, but will create an inclined plane effect. This inclined plane effect can produce slippage of the prosthesis away from the abutment teeth. In addition, it can cause orthodontic movement of abutment teeth, with concurrent pain and bone loss.

Fig 2-75



An occlusal rest must be at least 0.5 mm thick at its thinnest point and 1.0 - 1.5 mm thick where it crosses the marginal ridge.

Phoenix, RD. Stewart's Clinical Removable Partial Prosthodontics, 3rd Ed. Quintessence Publishing (IL), 2003.

123. Which of the following is not a method used to determine the vertical dimension of occlusion in patients?

A. Closest speaking space technique
B. Pre-extraction photographs
C. Boos' Bimeter technique
D. Silverman's Neuromuscular perception technique

Answer: D. Silverman's Neuromuscular perception technique

Silverman was credited with using the Closest Speaking Space as his technique in confirming the VDO of a patient. Lytle was credited with the neuromuscular perception technique. The Bimeter used by Boos is a meter that measures intraoral pressure. Pound was credited with using phonetics and esthetics in determining VDO.

Usually a combination of methods is the most helpful in determining a patient's VDO.

Peter E. Dawson, DDS. Evaluation, Diagnosis, and Treatment of Occlusal Problems, Second Edition. St. Louis: CV Mosby Company, 1974.

Pound E. Esthetic dentures and their phonetic values. J Prosthet Dent. 1951 Jan-Mar;1(1-2):98-111.

124. During the wax try-in procedure for your patient who will be receiving complete dentures, you notice that there is excessive whistling when your patient is speaking. All of the following could be causes of this except which one?

A. The palate is too narrow
B. The maxillary premolars are set too far medially
C. Insufficient amount of vertical overlap exists between the anterior teeth
D. The tongue is constricted during normal function
E. All of the above could be causes of whistling sounds

Answer: E. All of the above could be causes of whistling sounds

When a patient is speaking and words with "T" sound like "D", the maxillary anterior teeth are too far lingual, whereas if "D" sounds like "T", the maxillary anterior teeth are too far labial. "T" and "D" sounds are termed plosive sounds.

"Whistling is produced when there is an abnormal interincisal space: the upper and lower anterior teeth of the dentures are not in their proper positions and/or are constricting the tongue during normal function. These sounds can be produced if there is not sufficient vertical overlap of anterior teeth, even when there is no interincisal space."

Berland, LF. Transitional to Final Dentures: A detailed Process for the Fabrication of complete dentures – Part 2. Contemporary Esthetics, June 2006.

Comprehensive Complete Denture Syllabus, NPDS, Bethesda, MD.

125. In what stage of the treatment plan is the RDP design considered

a. After Oral surgery/Endodontic procedures
b. After Periodontal non surgical and surgical intervention
c. At the beginning, during the diagnosis stage
d. After tooth abutment preparation

ANSWER c. At the beginning, during the diagnoses stage

The preparation of the mouth is fundamental to a successful RDP . **Mouth preparation, perhaps more than any other single factor, contributes to the philosophy that the prescribed prosthesis must not only replace what is missing but also preserve the remaining tissue and structures that will enhance the RDP**. Mouth preparation follows preliminary diagnoses and the development of a tentative treatment plan. Final treatment planning may be deferred until the response to the prepatory procedures can be ascertained. In general, mouth preparation includes procedures in 4 categories. Oral surgical preparation, conditioning of abused and irritated tissue, periodontal preparation, and preparation of abutment teeth. Oral surgical and periodontal procedures should precede abutment tooth preparation and should be completed far enough in advance to allow the necessary healing period. If at all possible, 6 weeks, but preferably 3 to 6 months.

List of RDP treatment stages

1. Diagnoses (Endodontic, periodontal, residual ridge, abutment teeth prognosis, occlusion considerations, initial RDP design considerations)
    A. Tentative treatment plan
2. Mouth preparation
    A. Oral surgical preparation/Endodontic preparation
        a. extractions
        b. remove residual roots
        c. remove exostoses and tori
        d. Removal of hyperplasic tissue and highly attached muscles and frena
        e. Prescription NSRCT or NSRCT due to pulpal pathology
    B. Conditioning of abused tissues
    C. Periodontal preparation (non surgical and surgical)
3. Final RDP design and tooth abutment preparation

McCraken's Removable Partial Prosthodontics 11 edition pgs 231-254

126. Alginate impression material should be removed:

A. 2-3 minutes after initial set and slowly to avoid tearing
B. 2-3 minutes after gelation with a snap to avoid tearing
C. after initial set and slowly to avoid tearing
D. Immediately after gelation and with a snap to avoid tearing

Answer: B. 2-3 minutes after gelation with a snap to avoid tearing

- For optimum results the teeth should be cleaned and mouth thoroughly rinsed.
- Some drying is necessary, but excessively dried tooth surfaces will cause impression material to adhere
- Material is mixed to a homogeneous consistency
    - Regular set 60 sec
    - Fast set 45 sec
- Load into the tray, and smooth its surfaces with a moistened, gloved finger
- At same time, a small amount of material is wiped into crevices of the occlusal surfaces before the tray is seated
- As the tray is inserted into the patient's mouth and seated, the patient is reminded to relax the cheek muscles to allow the operator to manipulate muscles and soft tissue to capture hard and soft tissue anatomy and details
- A loss of tackiness of the material (gelation) implies initial set
- The tray should be removed quickly 2-3 minutes after gelation
- Teasing or wiggling the set impression from the mouth causes excessive distortion due to viscous flow
- Following removal, the impression should be rinsed and disinfected, dried slightly with a gentle air stream, and poured immediately (within 10 minutes if placed in a self-sealing plastic bag)

Rosenstiel. Contemporary Fixed Prosthodontics, third edition, 2001.

127. Alginate impressions must be poured immediately because of:

a. absorption of large amounts of water (syneresis)
b. absorption of large amounts of water (imbibition)
c. Production of an exudate leading to swelling (syneresis)
d. Production of an exudate leading to swelling (imbibitions)

Answer B

Gels that are formed with water are hydrophilic (water loving) in character and tend to imbibe large quantities of water if allowed to stand immersed. The imbibition is accompanied by swelling and a change in physical dimensions. When allowed to stand in dry air, the gel loses water to the atmosphere, with an accompanying shrinkage. Such changes may be observed readily in agar or alginate gels.

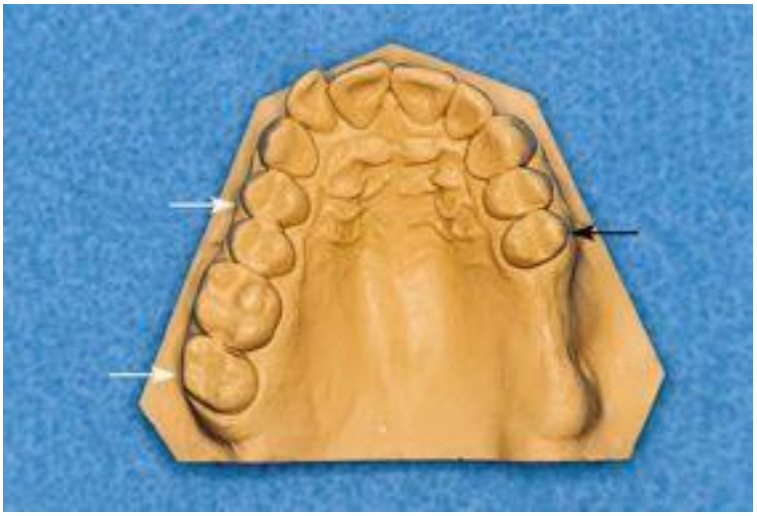
Syneresis - A characteristic of many gels is to contract on standing in closed containers and to exude or squeeze out some of the liquid phase. This process of accumulating an exudate on the surface is known as syneresis. The degree of attraction forces and the tenacity with which the filaments and fibers of the gel are held together have much to do with syneresis and the extent to which the exudate is formed. In dental impression-taking operations, the formation of exudates by syneresis is troublesome.

Powers and Sakaguchi, Craigs Restorative Dental Materials. 12th edition, p16 and 17.

...Because set irreversible hydrocolloid is largely water, it will readily absorb (by imbibition) as well as give off (by syneresis) liquid to the atmosphere, causing distortion of the impressions. Alginate impressions must therefore be poured immediately.

Rosenstiel, Land, Fujimoto. Contemporary Fixed Prosthodontics, 3rd edition, p.26

128. When considering the axis of rotation, which statement would not be appropriate for restoring the below pictured arch:



A. It should have three clasp assemblies.
B. It needs a rest on the mesial of #5 or the lingual surface of #6.
C. The rests should be gently rounded to allow ball-and-socket movement around the axis of rotation.
D. The primary axis of rotation passes through the indirect retainer and #13.

ANSWER: D. The primary axis of rotation passes through the indirect retainer and #13.

A Kennedy Class II removable partial denture should have three clasp assemblies. One of these should be located adjacent to the distal extension area *(black arrow).* The remaining clasp assemblies should be located on the opposite side of the arch and should be positioned with regard to structural and esthetic considerations *(white arrows).*

In a Kennedy Class II application, the primary axis of rotation passes through the most posterior abutment on each side of the dental arch (ie, the right second molar and left second premolar). To minimize movement of the distal

extension base away from the supporting tissues, an indirect retainer should be placed opposite the distal extension base and as far from the rotational axis as practical. In this instance, the indirect retainer would be positioned on the mesio-occlusal surface of the first premolar or the lingual surface of the canine.

Posterior rests are designed to direct forces within the long axes of the associated abutments. In I-bar applications, premolar rest seats are prepared in marginal and triangular ridges, and molar rest seats extend into the central fossae. Each rest should display a gently rounded bearing surface that allows ball-and-socket movement around the axis of rotation.

I-bar retainers should be positioned at or mesial to the mesiodistal height of contour. I-bars distant to the axis of rotation are not placed in retentive undercuts and provide frictional retention and horizontal stabilization.

To allow movement of the partial denture around the axis of rotation and to better distribute an occlusal load to the edentulous ridge, it is necessary to reduce binding between the framework and the abutments. This is accomplished by precise adjustment of the removable partial denture framework under physiologic loading conditions.

Indirect retention is provided by rests placed on secondary abutments located as far as is practical from the axis of rotation and the extension base.

Phoenix, RD. *Stewart's Clinical Removable Partial Prosthodontics, 3rd Ed*. Quintessence Publishing (IL), 2003.

129. Which of the following is a rule ascribed to Applegate in governing the application of the Kennedy Classification System for partially edentulous arches?

A. If the third molar is present and is to be used as an abutment, it is not considered in the classification
B. The most anterior edentulous area(s) always determine the classification
C. The extent of the modification is not considered, only the number of additional edentulous areas
D. Classification should precede extractions

Answer: C. The extent of the modification is not considered, only the number of additional edentulous areas

Kennedy Classification System:
Class I: Bilateral edentulous areas located posterior to the remaining natural teeth
Class II: A unilateral edentulous area located posterior to the remaining natural teeth
Class III: A unilateral edentulous area with natural teeth remaining both anterior and posterior to it
Class IV: A single, bilateral (crossing the midline), edentulous area located anterior to the remaining natural teeth

Applegate's rules for classification
1. Classification should follow rather than precede extractions that might alter the original classification
2. If the third molar is missing and not to be replaced, it is not considered in the classification
3. If a third molar is present and is to be used as an abutment, it is considered in the classification
4. If a second molar is missing and is not to be replaced (that is, the opposing second molar is also missing and is not to be replaced), it is not considered in the classification
5. The most posterior edentulous area(s) always determine the classification
6. Edentulous areas other than those determining the classification are referred to as modification spaces and are designated by their numbers
7. The extent of the modification is not considered, only the number of additional edentulous areas
8. There can be no modification areas in Class IV arches. Any edentulous area lying posterior to the single bilateral area determines the classification

Phoenix, Cagna, DeFreest. Stewart's Clinical Removable Partial Prosthodontics, 4th edition.

130. All statements concerning Kelly's Combination syndrome are true except:

a. The initiating factor is loss of mandibular posterior support
b. The resorption pattern can be minimized by placing implants in the maxillary posterior area
c. The syndrome can be minimized by placing implants in the mandibular posterior area
d. There is downward growth of the maxillary tuberosities in the later stage

ANSWER b. The resorption pattern can be minimized by placing implants in the maxillary posterior area

Combination syndrome generally is observed when a mandibular bilateral extension base RDP is opposed by a maxillary complete denture. In most instances, these prostheses lose some degree of support as a result of alveolar resorption. As this resorption occurs beneath the mandibular extension bases, support for the posterior prosthetic teeth is diminished. In turn, occlusal forces are concentrated within the anterior sextants. Increased forces in the anterior maxilla may result in resorption, with accompanying downward growth of the tuberosities and tipping of the occlusal plane.

Placement of implants in the mandibular posterior locations may combat the effects of combination syndrome by stabilizing the mandibular posterior occlusal surface. This results in a more stable occlusal plane and a more equitable distribution of forces to the opposing maxillary denture. Equitable distribution of forces is maintained, and the likelihood of combination syndrome is minimized.

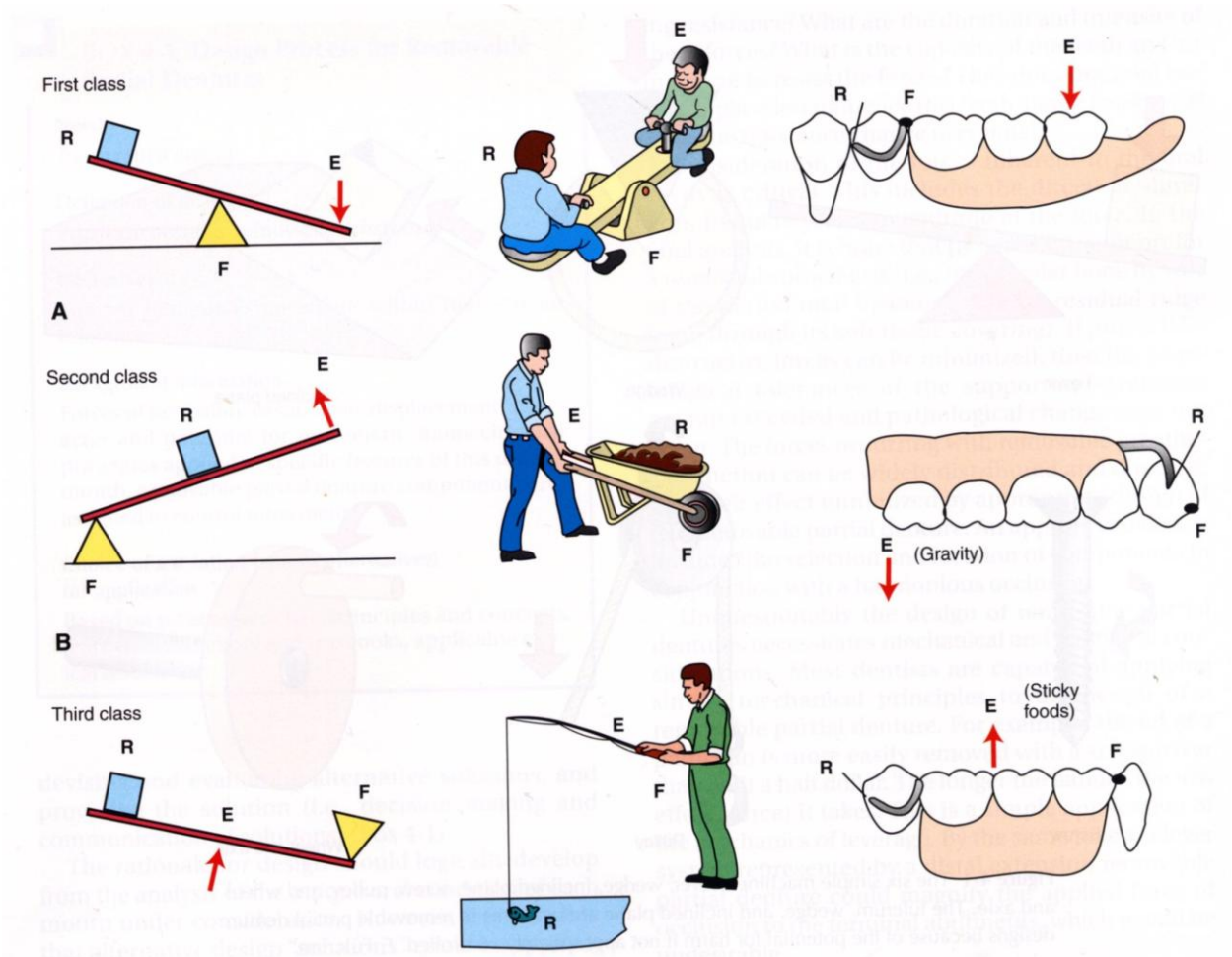
Phoenix RD. Stewart's Clinical Removable Partial Prosthodontics 4th edition pg 261

131. Which type of lever system below is a class 1 lever?

a. a mandibular distal extension, a distal rest on the terminal abutment and a supra-bulge retentive arm engaging a mesial undercut; the force is downward mastication
b. a maxillary distal extension, a mesial rest on the terminal abutment and a infra-bulge retentive arm engaging a mid-facial undercut; the force is downward gravity pull
c. a mandibular distal extension, a mesial rest on the terminal abutment and a supra-bulge retentive arm engaging a mesial undercut; the force is upward lifting from sticky foods
d. All of these situations represent an equal theoretical class 1 lever

ANSWER a. a mandibular distal extension, a distal rest on the terminal abutment and a supra-bulge retentive arm engaging a mesial undercut; the force is downward mastication

Think **FRE**E me from this physics class!
In a class 1 – The Fulcrum is in-between the resistance and the effort
In a class 2 – The Resistance is in-between the effort and the fulcrum.
In a class 3 – The Effort is in-between the fulcrum and the resistance.



The six simple machines are lever, wedge, screw, wheel and axle, pulley and inclined plane. Of the simple machines, **the lever and the inclined plane should be avoided in designing removable partial dentures.**

In its simplest form, a lever is a rigid bar supported somewhere along its length. It may rest on the support or may be supported from above. The support point of the lever is called the fulcrum, and the lever moves around the fulcrum.

The rotational movement of an extension baste type of RPD will rotate in relation to the three cranial planes because of difference in the support characteristics of the abutment teeth and the soft tissue covering the residual ridge. Even thought the actual movement of the denture may be small**, a lever force may be imposed on the abutment teeth. This is especially detrimental when prosthesis maintenance is neglected.** There are three types of levers: first, second, and third class.

A cantilever is a beam supported at one end and can act as a first class lever. 1st class is also described as a see saw. **The fulcrum is in the middle and the effort and resistance is on either end.**

A wheel barrow is a description of a second class lever. **The fulcrum is on the far end and the resistance and effort are adjacent to each other.**

A fishing pole is a description of a third class lever system. **The effort is in-between the fulcrum and the resistance.**

McCraken's Removable Partial Prosthodontics 11 edition. Pgs 25-32

132. Which one of the following is not a type of rotational path:

A. Anterior-posterior
B. Posterior-anterior
C. Medial
D. Lateral

Answer: C. Medial

Types of Rotational Path

1. Anterior-Posterior
2. Posterior-Anterior
3. Lateral

Categories of Rotational Path Designs

CAT- I

- Rotational centers located at the termini of the external rests of the rigid retainers
- Rotational centers on each side of the arch determine the axis of rotation for placement of the RDP
- Rotation centers are seated first, then the prosthesis is rotated into place
  - *Includes AP and PA rotation replacing posterior teeth*

CAT- II (Dual Path)

- Rotational centers are located at the gingival extensions of the rigid retainers
- Rotational centers on each side of the arch determine the axis of rotation for final placement of RDP
  - *Includes all AP paths of rotation replacing anterior teeth*
  - *Includes all lateral paths of rotation utilizing proximofacial undercuts*

Carr, McGivney, Brown, "McCracken's removable partial prosthodontics", Eleventh ed, Mosby, 2005.

133. Which of the following is true regarding A-P or P-A rotational path RPDs?

A. Requires more tooth preparation vs. an FPD or attachments
B. Cannot be used in the absence of lingual or facial undercuts
C. Minimizes the number of clasps needed compared to a conventional RPD
D. May cause further tipping of abutment teeth

Answer C.

Advantages of a Rotational Path RPD

Minimizes the number of clasps, reducing tooth coverage-may reduce plaque accumulation
Anterior clasps eliminated for improved esthetics
May be used in preference to an anterior FPD for better esthetics
Minimal tooth preparation Vs. FPD or attachments
Can be used in absence of lingual of facial undercuts
Distortion of rigid retentive component is unlikely
May prevent further tipping of abutment teeth

Disadvantages of Rotational Path RPDs

Adjustment of rigid retentive component is difficult
Less tolerance of error
Requires well prepared rest seats
If anterior flange needed, cannot use with Rotational Path RPD

CAPT Michael Marks, RPD-rotational path

It can be esthetically and financially daunting for patients to lose teeth in an anterior region of the mouth. For these patients, traditional treatment options presented in the past have included fixed partial denture, implants, and conventional removable partial denture (RPD). For patients faced with financial, anatomical, and/or esthetic limitations, the edentulous region can be restored successfully with a rotational path RPD. Rotational path RPD designs have often been overlooked by the dental profession due to its complex concepts involving the prosthetic design and sensitive laboratory techniques. With better understanding of the concepts and design, the dental clinician can deliver the highest esthetic outcome in compromised areas in which other treatment options may often face limitations. This paper reviews the method used to esthetically design and plan a posterior-anterior rotational path RPD in an edentulous mandibular anterior region for a patient missing the mandibular incisors.

CLINICAL SIGNIFICANCE

Due to inadequate understanding of the mechanics of rotational path RPDs, many clinicians have not adapted the application of this advantageous prosthesis. When correctly designed and fabricated, the rotational path RPD provides improved esthetics, cleanliness, and retention for patients who may not be suitable candidates for implants or fixed partial dentures in tooth supported edentulous regions.

Suh J, Billy E. Rotational Path Removable Partial Denture (RPD): Conservative Esthetic Treatment Option for the Edentulous Mandibular Anterior Region J Esthet Restor Dent 20:98–107, 2008.

134. When arranging complete dentures in Lingualized Occlusion, what is the appropriate combination of denture tooth forms.

A. upper and lower anatomical
B. upper anatomical and lower nonanatomical
C. upper and lower nonanatomical
D. upper nonanatomical and lower anatomical

ANSWER: B. upper anatomical and lower nonanatomical

There are several schools of thought on the choice of occlusal forms of posterior teeth for the three concepts of occlusion most often selected, namely, (1) bilateral balance, (2) monoplane or nonanatomical, and (3) lingualized articulations. Anatomical molds usually are selected for bilateral balanced articulation; however, nonanatomical teeth can be used in a balanced concept with the use of compensating curves. Nonanatomical or cuspless teeth are generally the choice for monoplane articulation, although teeth with cusps also can be used. For the lingualized occlusal concept, a combination of upper anatomical and lower nonanatomical molds has been introduced by several tooth manufacturers.

Lingualized integration is based on the maxillary lingual cusp functioning as the main supporting cusp in harmony with the occlusal surfaces of the lower teeth. From the position of maximum intercuspation, the maxillary lingual cusps glide over the opposing teeth with an absence of deflection during nonrestrictive lateral and protrusive movements.

Zarb, George. *Prosthodontic Treatment for Edentulous Patients: Complete Dentures and Implant-Supported Prostheses, 12th Edition*. Mosby, 2003.

135. In order for you to fabricate a mandibular removable partial denture using a lingual bar as the major connector, a minimum amount of space between the gingival margins of the teeth and floor of the mouth should exist. To accommodate a lingual bar at least how much space is needed?

A. 8mm of total space: 4mm of space for the lingual bar and 4mm of space between the gingival margins and superior border of the bar
B. 8mm of total space: 5mm of space for the lingual bar and 3mm of space between the gingival margins and superior border of the bar
C. 8mm of total space: 3mm of space for the lingual bar and 5mm of space between the gingival margins and superior border of the bar
D. 10mm of total space: 4mm of space for the lingual bar and 6mm of space between the gingival margins and superior border of the bar

Answer: B. 8mm of total space: 5mm of space for the lingual bar and 3mm of space between the gingival margins and superior border of the bar

Failure to provide 3mm of space between the gingival margins of the teeth and the superior border of the lingual bar may lead to tissue irritation. In a clinical setting, a periodontal probe is used to determine the amount of space, with the patient protruding and elevating their tongue to raise the floor of the mouth to the height of function. The lingual bar should be located in the most apical position the movable soft tissues will allow.

When viewed in cross section, the lingual bar is pear-shaped with the broadest portion located at the inferior border.

Advantages: Simplicity, minimal contact with remaining teeth and soft tissues
Disadvantages: framework may not be rigid if not fabricated properly

Phoenix, Cagna, DeFreest. Stewart's Clinical Removable Partial Prosthodontics, 4th edition.

136. Which one of the following is not a factor in the amount of retention provided by a clasp assembly:

A. Type of clasp used
B. Flexibility of the retentive arm
C. Passivity of the reciprocal arm
D. Axial convergence of the tooth

Answer: C. Passivity of the reciprocal arm

All clasp assembly must satisfy 6 requirements

1. Retention
2. Support
3. Stability
4. Reciprocation
5. Encirclement
6. Passively

Amount of retention provided by a clasp assembly is dependent upon many factors, including:

1. Type of clasp used
2. Flexibility of the retentive arm
3. Axial convergence of tooth surfaces apical to the height of contour

Flexibility of the retentive arm is influenced by:

1. The Length
2. Cross-sectional form
3. Cross-sectional diameter
4. Longitudinal Taper
5. Clasp Curvature
6. Metallic characteristics of alloy

Clasp flexibility ↑ as clasp length ↑ ; Clasp flexibility ↑ as clasp diameter ↓
Uniformly tapered clasp is more flexible than a non-tapered clasp of same proximal dimension
Cross-sectional dimension at the shoulder of the clasp should be 2x of one at the terminus

Carr, DMD, MS, McGivney, DDS, FACD, Brown, DDS, MS, "McCracken's removable partial prosthodontics", Eleventh edition, Mosby, 2005.

137. Advantages of a chairside remount include all of the following except:

a. Articulation on an articulator creates a stable base in which accurate centric or eccentric marks are made
b. Does not allow the patient to see adjustment of the denture
c. Eliminates the errors in processing and reestablishes OVD
d. Selective grinding on an articulator decreases the errors in occlusion

ANSWER c. Eliminates the errors in processing and reestablishes OVD

Laboratory remounts and selective grinding to allow the incisal pin to close will eliminate processing errors. It will not eliminate errors produced by the impression or jaw relation records. It will not eliminate errors that develop when the dentures are removed from the casts or are polished. Therefore new interocclusal records should be made at the time new dentures are first inserted into the mouth. Denture base acrylics resin absorbs water and saliva. This absorption causes a 1-3% expansion and can alter the relationships of the cusps' inclined planes. After finishing of the dentures, the prosthesis should be maintained in water so this dimensional change occurs before the final occlusal refinement that is accomplished at the insertion appointment. To avoid dimensional and occlusal changes, patients should be advised to store dentures in water.

To observe error, the dentist should guide the mandible into CR, while supporting the lower denture intraorally. If articulating paper is used in the mouth to locate interceptive or deflective occlusal contacts, shifting of the denture bases, tissue distortions, or eccentric closures by the patient, as well as the presence of saliva, can all prevent the articulating paper marks from accurately recording errors. Much of the selective grinding done in the mouth according to articulating paper marks made actually increase the amount of errors in the occlusion.

If grinding the occlusion is attempted in the presence of the patient, the operation may appear to the patient to be one of correcting an error made by the doctor. Thus there is a psychological advantage in doing the selective grinding on an articulator away from the patient.

Zarb-Bolender "Prosthodontic Treatment for Edentulous Patients" 12th edition pgs 405-409

138. When surveying a cast for cast removable dental prosthesis

A. Start with Lateral tilt to evaluate abutment undercuts
B. Start with Lateral tilt to determine abutment parallelism
C. Start with A-P tilt to evaluate abutment undercuts
D. Start with A-P tilt to determine abutment parallelism

Answer: D. Start with A-P tilt to determine abutment parallelism

Four critical factors to consider when determining most favorable tilt of a cast:

Establishing appropriate guide planes
Presence of suitable undercuts
Elimination of hard and soft tissue interferences
Creation of desirable esthetics

To surveying a cast:

Start with occlusal plane parallel to the deck
Find the AP tilt with greatest parallelism of the abutments for the Guide Planes
Find the Lateral tilt that provides the best undercuts for retention

Carr, McGivney, Brown, McCracken's removable partial prosthodontics, Eleventh edition, Mosby, 2005.